

Variability of topsoil unsaturated hydraulic conductivity as a result of seasonal rainfall impacts

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On arable lands, the topsoil is exposed to structural changes within each growing season due to agriculture management, the kinetic energy of rainfall, crop and root growth. The shape, size, and spatial distribution of soil aggregates are considerably altered and thus affect the water infiltration and soil moisture regime. Bare topsoils are prone to soil compaction, surface sealing, soil structure degradation and preferential pathways disconnection. To study the topsoil infiltration properties in time, near-saturated hydraulic conductivity of the topsoil was repeatedly assessed at the catchment in central Bohemia (Czech Republic) during three consecutive growing seasons using a recently developed automated tension minidisk infiltrometer. The seasonal variability of soil bulk density and saturated water content was observed as the topsoil consolidated between the seedbed preparations. The topsoil unsaturated hydraulic conductivity was lower in spring and increased in the summer months during two seasons, opposite trend was observed during one season. The temporal unsaturated hydraulic conductivity variability was higher than the spatial variability. The trends between cumulative kinetic energy of the received rainfalls, as a main cause of the seasonal soil macroporosity decrease, and unsaturated hydraulic conductivity were not statistically significant. This research was performed within the projects GF17-33751L, I 3049 and TA01021844.